



**University of  
Zurich**<sup>UZH</sup>

**Zurich Open Repository and  
Archive**

University of Zurich  
University Library  
Strickhofstrasse 39  
CH-8057 Zurich  
[www.zora.uzh.ch](http://www.zora.uzh.ch)

---

Year: 2010

---

## **Local transmission of the eye worm *Thelazia callipaeda* in southern Germany**

Magnis, J ; Naucke, T J ; Mathis, A ; Deplazes, P ; Schnyder, M

**Abstract:** This report describes the first assumed locally transmitted case of the eye worm *Thelazia callipaeda* in a dog living in southern Germany. A four year old, male golden retriever from the town of Bühl in north eastern Baden-Württemberg, about 10 km from the German-French border, showed one sided lacrimation for over two weeks. Despite the application of antibiotics, there was no improvement, and the dog additionally showed blepharospasmus, epiphora and red conjunctivas. A deepened eye inspection revealed five whitish, filiform parasites which were morphologically identified as *T. callipaeda*. The partial sequence of the mitochondrial cytochrome c oxidase subunit 1 gene (cox1, 605 bp) from one specimen revealed a novel haplotype, which differs by 1.3% from the only one (haplotype 1) identified in Europe so far. Since the infected dog had never been abroad with the exception of two daytrips to the close Alsace region in France, the transmission of *T. callipaeda* most probably was domestic. With the presence of end hosts and *Phortica* flies nourishing on lachrymal secretions acting as intermediate hosts, and an increasing number of dogs travelling to and coming from endemic regions in the South, the establishment of *T. callipaeda* in large parts of Europe cannot be excluded.

DOI: <https://doi.org/10.1007/s00436-009-1678-4>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-24272>

Journal Article

Published Version

Originally published at:

Magnis, J; Naucke, T J; Mathis, A; Deplazes, P; Schnyder, M (2010). Local transmission of the eye worm *Thelazia callipaeda* in southern Germany. *Parasitology Research*, 106(3):715-717.

DOI: <https://doi.org/10.1007/s00436-009-1678-4>

# Local transmission of the eye worm *Thelazia callipaeda* in southern Germany

Johannes Magnis • Thorsten J. Naucke •  
Alexander Mathis • Peter Deplazes • Manuela Schnyder

Received: 9 October 2009 / Accepted: 28 October 2009 / Published online: 24 November 2009  
© Springer-Verlag 2009

**Abstract** This report describes the first assumed locally transmitted case of the eye worm *Thelazia callipaeda* in a dog living in southern Germany. A 4-year-old male golden retriever from the town of Bühl in north eastern Baden-Württemberg, about 10 km from the German–French border, showed one sided lacrimation for over 2 weeks. Despite the application of antibiotics, there was no improvement, and the dog additionally showed blepharospasmus, epiphora and red conjunctivas. A deepened eye inspection revealed five whitish filiform parasites that were morphologically identified as *T. callipaeda*. The partial sequence of the mitochondrial cytochrome c oxidase subunit 1 gene (cox1, 605 bp) from one specimen revealed a novel haplotype, which differs by 1.3% from the only one (haplotype 1) identified in Europe so far. Since the infected dog had never been abroad with the exception of two daytrips to the close Alsace region in France, the transmission of *T. callipaeda* most probably was domestic. With the presence of end hosts and *Phortica* flies nourishing on lachrymal secretions acting as intermediate

hosts and an increasing number of dogs travelling to and coming from endemic regions in the South, the establishment of *T. callipaeda* in large parts of Europe cannot be excluded.

## Introduction

*Thelazia* nematodes (Spirurida, Thelazioidea), phylogenetically closely related with *Spirocerca lupi* (Iorio et al. 2009), are commonly known as eyeworms and cause ocular infection in animals and humans. In particular, *Thelazia callipaeda* has been described as the causative agent of canine thelaziosis in Asia, and since the 1990s in endemic regions in southern Europe. Adult whitish nematodes of about 0.5–2 cm and the first larval stages (L1) can be found particularly under the third eye lid provoking lacrimation, conjunctivitis or even keratitis and corneal ulcer (Otranto and Traversa 2005). In Europe, *T. callipaeda* is transmitted by *Phortica variegata*, as shown in Italy under natural and experimental conditions (Otranto et al. 2005a). These drosophilid fruit flies of the family of the Steganinae not only feed on fruit juice but also on lachrymal secretions of carnivores, thereby, assimilating first larval stages of *T. callipaeda*, which develop into infectious third stage larvae within 3 weeks (Otranto et al. 2004).

In Europe, local transmissions of this nematode were reported in domestic dogs and cats, but also in wild foxes and wolves (Otranto et al. 2007). The first case of thelaziosis in a European dog was reported from northern Italy (Rossi and Bertaglia 1989). Surveys performed between 1995 and 2002 in herding and hunting dogs in southern and northern Italy revealed prevalences of 41.8% and 23.1%, respectively, but also four cats and 5.1% of foxes were *Thelazia*-positive in northern Italy (Otranto et al. 2003).

J. Magnis  
Kleintierklinik Dr. S. Wisniewski,  
An der Rennbahn 16a,  
76473 Iffezheim, Germany

T. J. Naucke  
Institute of Medical Microbiology, Immunology and Parasitology,  
University Hospital Bonn,  
Sigmund Freud Strasse 25,  
53105 Bonn, Germany

A. Mathis • P. Deplazes • M. Schnyder (✉)  
Institute of Parasitology, University of Zurich,  
Winterthurerstrasse 266a,  
8057 Zurich, Switzerland  
e-mail: manuela.schnyder@access.uzh.ch

Imported *Thelazia*-cases in dogs, which had been travelling to Italy, were initially reported from France (Bussi  ras et al. 1996), southern Switzerland in 2000 (Malacrida et al. 2008) and Germany (Hermosilla et al. 2004). Subsequent investigations between 2005 and 2007 in southern Switzerland (canton Ticino) revealed prevalences in dogs and foxes of 6.2% and 11.1%, respectively, in the most southern part. In addition, five cats were also affected (Malacrida et al. 2008). All these cats and 58% of the infected dogs had never left the country. Local infections of four dogs and one cat were also described from the Dordogne region in the southwest of France (Dorchies et al. 2007). Finally, *T. callipaeda* infections were described in four human patients in Italy and France (Otranto and Dutto 2008). We, here, describe for the first time a case of *T. callipaeda* in a dog from north of the Alps without a travel history to known endemic regions.

## Results and discussion

A 4-year-old male golden retriever from the town of B  hl in the north eastern Baden-W  rttemberg (Fig. 1), about 10 km from the German–French border, showed one sided lacrimation for over 2 weeks. Despite the application of an ocular ointment containing the antibiotic gentamicin, there was no improvement and the lacrimation worsened. The

dog also showed middle graded blepharospasmus, epiphora and red conjunctivas on the right eye.

After local instillation of an anaesthetic, the third eye lid was lifted, and five whitish filiform parasites were detected. The nematodes were mechanically removed and morphologically identified as *T. callipaeda* according to Bhaibulaya et al. (1970). In order to confirm the morphological identification, a partial sequence of the mitochondrial cytochrome c oxidase subunit 1 gene (cox1, 605 bp) was determined from one specimen as previously described (Otranto et al. 2005b). Thus, a novel haplotype was identified, differing by 1.3% from haplotype 1, which is the only one found so far in the known endemic areas in Southern Europe and in animals with a travel history to these regions (Dorchies et al. 2007; Malacrida et al. 2008; Otranto et al. 2005b). Alternatively, scanning electron microscopy can be used to distinguish specimens belonging to the Thelaziidae (Naem 2007).

The affected dog is living in the centre of B  hl and gets walked three times a day, mainly in the city park. Additionally, the dog spends 1 day/week in a kennel in an animal pension, where he has contact to 10–12 other dogs. All these dogs were also subjected to a deepened eye inspection but none harboured eye worms. Since the infected dog had never been abroad with the exception of two daytrips to the close Alsace region, the transmission of *T. callipaeda* most probably was domestic. Most interestingly, the identification of a novel haplotype supports the assumption that the parasite has not been imported from known endemic European areas and therefore endorses an autochthonous transmission. The considered region in south West Germany is about 120 m above sea level in a region where also fruits are being cultivated. Interestingly, also strawberry fields are close by, as in Dordogne, where the first locally transmitted cases in France were described (Dorchies et al. 2007).

The presentation of this first assumed locally transmitted case of *T. callipaeda* in Germany demonstrates the potential of a further spread of this parasite in Europe. An ecological niche model based on the ecology and on the distributional data of *P. variegata* (Drosophilidae, Steganinae) in Europe had identified large parts of central Europe as suitable areas of this vector and intermediate host for *T. callipaeda* (Otranto et al. 2006). Other flies with zoophilic parasitic behaviour from the same family of the Steganinae, such as *Phortica semivirgo*, are discussed as vectors for the transmission of *T. callipaeda*. The morphological differentiation of *P. variegata* and *P. semivirgo* is arduous; therefore, a molecular identification by PCR-RFLP of the mitochondrial cytochrome oxidase c subunit I gene has been proposed (Cantacessi et al. 2008). Since dogs and also foxes as reservoir hosts are widely present in settlement areas as well as in recreational areas close to towns, a limiting factor for transmission and spread of *T. callipaeda*



**Fig. 1** Map showing the location of the described canine case of an assumed locally transmitted infection with the eye worm *Thelazia callipaeda* (star, town of B  hl) and the closest known endemic region (the cross mark indicates Ticino, southern Switzerland)

may be a low population size and/or a short activity season of the incriminated zoophilic fruit flies north of the Alps. Indeed, a recent investigation has revealed the presence of *Phortica* spp. in Zürich (Switzerland) albeit at a lower density and during a shorter season as compared to an area in Ticino (Roggero et al. unpublished). Hence, with the presence of intermediate and end hosts and an increasing number of dogs travelling to and coming from endemic regions, the establishment of *T. callipaeda* in large parts of Europe cannot be excluded.

Previously diagnosed nematode infections in dog's eyes in Europe include *Onchocerca* spp., *Angiostrongylus vasorum* and *Dirofilaria repens* (King et al. 1994; Hermosilla et al. 2005a; Hermosilla et al. 2005b). Therefore, in case of conjunctivitis in dogs and cats, not only viral or bacterial but also parasitic etiologic agents have to be considered even without travel history to known endemic regions of these parasites.

This publication represents a part of the dissertation of Johannes Magnis, veterinarian.

## References

- Bhaibulaya M, Prasertsilpa S, Vajrasthira S (1970) *Thelazia callipaeda* Railliet and Henry, 1910, in man and dog in Thailand. Am J Trop Med Hyg 19:476–479
- Bussi  ras J, Chermette R, Seillier A-M (1996) Quelques parasitoses canines exceptionnelles en France. II - Un cas de conjonctivite parasitaire du chien, due   *Thelazia* sp. Prat M  d Chir Anim Compagnie 31:83–85
- Cantacessi C, Traversa D, Testini G, Lia RP, Cafarchia C, M  ca J, Otranto D (2008) Molecular identification of *Phortica variegata* and *Phortica semivirgo* (Drosophilidae, Steganinae) by PCR-RFLP of the mitochondrial cytochrome oxidase *c* subunit I gene. Parasitol Res 103:727–730
- Dorchies P, Chaudieu G, Sim  on LA, Cazalot G, Cantacessi C, Otranto D (2007) First reports of autochthonous eyeworm infection by *Thelazia callipaeda* (Spirurida, Thelaziidae) in dogs and cat from France. Vet Parasitol 149:294–297
- Hermosilla C, Herrmann B, Bauer C (2004) First case of *Thelazia callipaeda* infection in a dog in Germany. Vet Rec 154:568–569
- Hermosilla C, Hetzel U, Bausch M, Grubl J, Bauer C (2005a) First autochthonous case of canine ocular onchocercosis in Germany. Vet Rec 156:450–452
- Hermosilla C, Pantchev N, Dyachenko V, Gutmann M, Bauer C (2005b) Erste autochthone okul  re *Dirofilaria repens* - Infektion beim Hund in Deutschland. Proceedings of the DVG meeting "Parasitologie und parasit  re Krankheiten", Potsdam, June 2005, p 59 (in German)
- Iorio R,   lapeta J, Otranto D, Paoletti B, Giangaspero A, Traversa D (2009) Phylogenetic relationships of *Habronema microstoma* and *Habronema muscae* (Spirurida: Habronematidae) within the order Spirurida inferred using mitochondrial cytochrome *c* oxidase subunit 1 (*cox1*) gene analysis. Parasitol Res 104:979–984
- King MCA, Grose RMR, Startup G (1994) *Angiostrongylus vasorum* in the anterior chamber of a dog's eye. J Small Anim Pract 35:326–328
- Malacrida F, Hegglin D, Bacciarini L, Otranto D, Nageli F, Nageli C, Bernasconi C, Scheu U, Balli A, Marengo M, Togni L, Deplazes P, Schnyder M (2008) Emergence of canine ocular Thelaziosis caused by *Thelazia callipaeda* in southern Switzerland. Vet Parasitol 157:321–327
- Naem S (2007) Morphological differentiation among three *Thelazia* species (Nematoda: Thelaziidae) by scanning electron microscopy. Parasitol Res 101:145–151
- Otranto D, Traversa D (2005) *Thelazia* eyeworm: an original endo- and ecto-parasitic nematode. Trends Parasitol 21:1–4
- Otranto D, Dutto M (2008) Human thelaziosis, Europe. Em Inf Dis 14:647–649
- Otranto D, Ferroglio E, Lia RP, Traversa D, Rossi L (2003) Current status and epidemiological observation of *Thelazia callipaeda* (Spirurida, Thelaziidae) in dogs, cats and foxes in Italy: a "coincidence" or a parasitic disease of the Old Continent? Vet Parasitol 116:315–325
- Otranto D, Lia RP, Buono V, Traversa D, Giangaspero A (2004) Biology of *Thelazia callipaeda* (Spirurida, Thelaziidae) eye-worms in naturally infected definitive hosts. Parasitol 129:627–633
- Otranto D, Lia RP, Cantacessi C, Testini G, Troccoli A, Shen JL, Wang ZX (2005a) Nematode biology and larval development of *Thelazia callipaeda* (Spirurida, Thelaziidae) in the drosophilid intermediate host in Europe and China. Parasitol 131:847–855
- Otranto D, Testini G, De Luca F, Hu M, Shamsi S, Gasser RB (2005b) Analysis of genetic variability within *Thelazia callipaeda* (Nematoda: Thelazioidea) from Europe and Asia by sequencing and mutation scanning of the mitochondrial cytochrome *c* oxidase subunit 1 gene. Mol Cell Probes 19:306–313
- Otranto D, Brianti E, Cantacessi C, Lia R, M  ca J (2006) The zoophilic fruitfly *Phortica variegata*: morphology, ecology and biological niche. Med Vet Entomol 20:358–364
- Otranto D, Cantacessi C, Mallia E, Lia R (2007) First report of *Thelazia callipaeda* (Spirurida, Thelaziidae) in Wolves in Italy. J Wildl Dis 43:508–511
- Rossi L, Bertaglia PP (1989) Presence of *Thelazia callipaeda* Railliet & Henry, 1910, in Piedmont, Italy. Parassitologia 31:167–172